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An Elevated Net Assembly to Capture Nesting Raptors

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The use of a Great Horned Owl (*Bubo virginianus*) to induce mobbing behavior, in combination with a net system, has become the technique of choice for capturing many species of nesting raptors (Hamerstrom 1963, Bloom 1987, Bloom et al. 1992, Steenhof et al. 1994, Jacobs 1996, McCloskey and Dewey 1999). However, some species, and some individuals trapped previously, may be reluctant to stoop at the owl when conventional techniques (i.e., placing owl and nets near ground level) are followed (Rosenfield and Bielefeldt 1993). In testing a mounted and live Great Horned Owl to induce mobbing behavior in American Kestrels (*Falco sparverius*), Gard et al. (1989) found that the closer an owl decoy was placed to the nest the more aggressive the kestrels became. A decoy (mounted or live) placed near the nest of "trap shy" Cooper's Hawks (*Accipiter cooperii*) was more effective than conventional techniques, but this method required climbing tree(s) and was found to be time consuming (Rosenfield and Bielefeldt 1993). Here we describe an elevated net assembly that, in combination with an owl decoy, proved successful for trapping five species of raptors.

Materials and Methods

The system consisted of an aluminum telescoping pole, a horizontal cross bar, two vertical upright poles, a dho-gaza type net (Clark 1981), and a mechanical owl (equipped with two radio controlled servos that provided movement to the owl's head and perch) as described by Jacobs (1996; Fig. 1). The cross bar that supported the net assembly was a 3-m section of conduit tubing 2.5 cm in diameter. We used a commercially available conduit-bending tool to form 90° angles 25 cm from each end of the tubing, resulting in a "U"-shaped cross bar. A section of sheet metal (45 cm × 45 cm) was then bent around the cross bar to form a triangular bracket that enveloped the cross bar. Using sheet metal screws, this sheet metal envelope was attached to a 25-cm section of aluminum tubing 3 cm diameter at the center of the cross bar to form a "T" that resembled the goal posts of most American football fields. The "T" formation provided a stable base for the net assembly and the diameter of the base of the "T" allowed for quick insertion of the cross bar to a telescoping pole. Two 2.2-m sections of conduit tubing 1.8 cm in diameter were inserted into the upturned ends of the cross bar to form the uprights that supported the net. We used four tethered leads about 12 cm in length, four metal rings (shower curtain rings) about 5 cm in diameter, and either wooden clothespins or magnets to attach the four corners of the net to the tops and bottoms of uprights. When clothespins were used, the free ends of the tethered leads were held by clothespins taped to the top two ends of the uprights. When magnets were used, a metal washer tied to the free end of the tethered leads provided support for the top two corners of the net. The bottom two leads were attached to the bottom of the uprights and remained stationary. Two metal rings were placed on each side of the net, one in the top corner and one at the half-way point. The rings attached the net to the uprights allowing the net to remain open during set-up. The rings also allow the net to drop freely to the cross bar when a bird made contact Once contact is made with the net, the net slides down the uprights and creates a pocket entrapping the bird. We inserted a 10-cm section of tubing (vertical, 1.1 cm in diameter) into the bottom of the owl's perch and attached a corresponding 30-cm section of tubing (0.9 cm diameter) to the "T." This was positioned so that about 15 cm of the tubing extended above the center of the cross bar to support the owl's perch.

The 2–8 m telescoping pole allowed us to adjust the height of the net assembly to suit the nest site. Three guy lines attached to the base of the "T" bracket stabilized the net assembly when the telescoping pole was extended to a height greater than 3 m. We used a 1-m section of 1.3 cm diameter conduit tubing, hammered flat at one end and cut to form a point, as support stakes for the telescoping pole and 0.5 m stakes (fashioned the same way) for the guy lines. Total cost of materials was ca. $250 (U.S.); telescoping pole ($180), net ($20), cross bar ($10), uprights ($10), anchor stake for telescoping pole ($10), guy lines and support stakes ($10), and miscellaneous material ($10).

Because vegetation structure varied among nest sites, we elevated the net assembly to the maximum length of the support pole (8 m) or to the highest feasible level where tree branches blocked a greater extension. The net assembly was placed within 50 m of the nest tree, in

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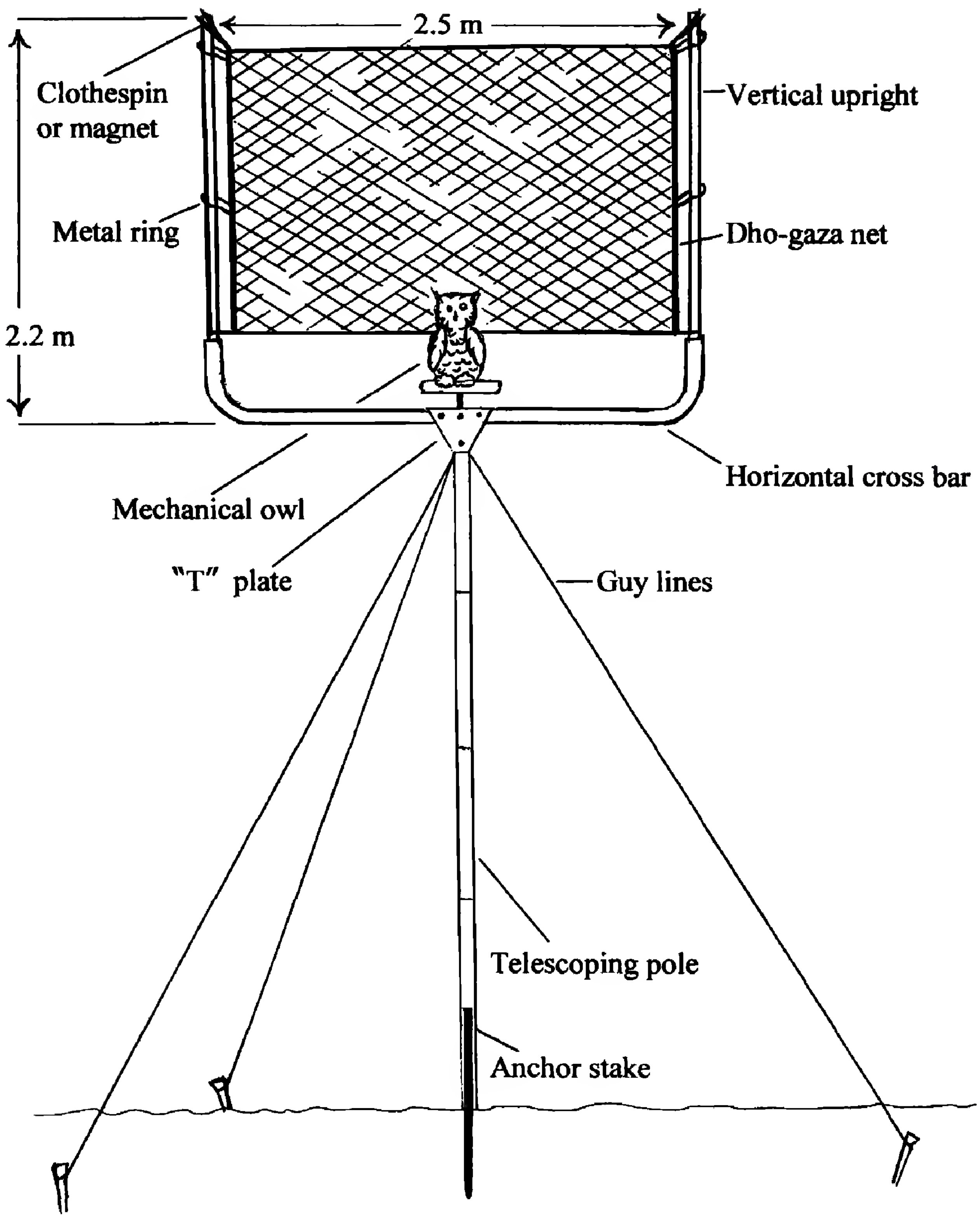

Figure 1. Elevated dho-gaza net assembly used to trap small- and medium-sized raptors near their nests.

view of the nest and with a clear flight path around the net. Great Horned Owl vocalizations and conspecific calls were utilized to lure nesting raptors to the net system (Bloom et al. 1992). A concealed observer was positioned nearby (<100 m) to operate the radio controls to the mechanical owl and record the sex of the adults when they were detected in the nest area (<50 m of nest). The observer(s) was able to sex all American Kestrels and Sharp-shinned Hawks (*A. striatus*) from plumage characteristics or relative size compared to their mates (Clark and Wheeler 1987). We reported trapping success by using the number of birds trapped, divided by the number of birds "tested" (birds detected within 50 m of the nest) multiplied by 100.

When trapping Ferruginous Pygmy-Owls (*Glaucidium brasilianum*), we modified this system by downsizing the net assembly (cross bar and uprights) to 2 m × 1 m, replacing the dho-gaza with a shortened 2-shelf mist net, and replacing the mechanical owl with a conspecific mounted decoy. This modified setup was used as described above (using lure to induce mobbing behavior from nesting owls), or simply placed in front of the nest cavity entrance to capture the adults as they entered the cavity to feed nestlings. The elevated mist net was placed about 1.5 m from the nest cavity's entrance.

Results and Discussion

During the breeding seasons (1994–2001) this technique was "tested" on five species of small to medium sized raptors. Overall, we successfully captured 73% (113 of 154) of the individuals "tested." Our trapping success

Table 1. Comparison of capture rates of elevated net with a mechanical owl, normal net with a mechanical owl, and normal net with a live owl as a trapping technique for raptors.

	ELEVATED NET WITH MECHANICAL OWL (THIS STUDY)	GROUND-LEVEL WITH MECHANICAL OWL (JACOBS 1996)	GROUND-LEVEL WITH LIVE OWL
Red-shouldered Hawk	65% (30 of 46)	54% (15 of 28)	75% (199 of 264)[1]
Sharp-shinned Hawk	81% (34 of 42)	77% (48 of 62)	—
American Kestrel	70% (21 of 30)	—	71% (15 of 21)[2] 97% (115 of 118)[1]
Cooper's Hawk	67% (2 of 3)	60% (3 of 5)	52% (32 of 62)[1]
Ferruginous Pygmy-Owl	79% (26 of 33)	—	—

[1] Data from Bloom et al. 1992.
[2] Data from Steenhof et al. 1994.

was generally similar or slightly lower than studies using a ground-level net set (height ≤2.5 m) and live owl (Bloom et al. 1992, Steenhof et al. 1994) and slightly better than Jacobs (1996) found when using a normal net set and a mechanical owl (Table 1).

Bloom (1987) occasionally found it was difficult or time consuming to capture both sexes of Northern Goshawks (*A. gentilis*). Females were usually caught within 15 min, but males were often not captured. He speculated that the male is less aggressive toward the owl during the post-fledging period or is away from the nest (hunting) and is unaware of the owl's presence. With Sharp-shinned Hawks and American Kestrels, we found of the birds that were present (assumed to have seen the owl), females responded more aggressively toward the owl mount than did males. Trapping success for female Sharp-shinned Hawks and female American Kestrels were 91% (21 of 23) and 79% (11 of 14), respectively. Males of both species occasionally showed a reluctance to "stoop" at the owl, resulting in a trapping success of 68% (13 of 19) for male Sharp-shinned Hawks and 63% (10 of 16) for male American Kestrels. The escape rate (percentage of birds that hit the dho-gaza net, but were not captured) was 1.8% (2 of 113).

Benefits of this technique include: (1) a high response rate; (2) a low escape rate; (3) the ability to readily adjust net height; (4) minimal space (especially when compared to a 12-m mist net) is required for setup; (5) this technique kept the net off the ground, and hence, required less preparation time to reset the net after a capture when compared to a ground-level dho-gaza net.

Albanese and Piaskowski (1999) and Stokes et al. (2000) have described similar techniques that use elevated mist nets to study birds that spend the majority of their time in woodland canopies. However, those studies used conventional mist nets in a manner designed for continuous use at one location. Our technique was designed to capture specific birds near their nest sites with a mobile apparatus that allows researchers to visit multiple locations with a minimal amount of setup time (ca. 15 min).

Even though we conducted 113 captures without any visible injury, there is the potential for serious injury to species that "stoop" at higher speeds and are of greater mass than the Red-shouldered Hawk. A net that completely releases from the uprights (Bloom 1987) as well as other modifications may be necessary to accommodate the force of a larger raptor hitting the net. Alternatively, because the "cut-down" mist net was successful in capturing Ferruginous Pygmy-Owls as they approached or exited the entrance to their nest cavity, this technique should be effective for trapping most small cavity-nesting birds without modification.

RESUMEN.—Debido a su alta tasa de éxito, el uso de una red de niebla en combinación con un señuelo de *Bubo virginianus,* es una de las técnicas populares mas usadas para capturar rapaces durante su anidación. Sin embargo, el protocolo estándar para esta técnica limita su efectividad a aves que tiene la habilidad de volar cerca al nivel del suelo (≤3 m) para atropellar al señuelo. Con el fin de proveer una técnica alternativa que pueda mejorar la tasa de captura en algunas situaciones, construimos y probamos un ensamblaje de redes elevado consistente de un poste telescopico de aluminio, una barra cruzada horizontal, dos postes verticales rectos, una red de niebla, y un búho mecánico. Desde 1994–2001, el éxito en la captura de cinco especies de rapaces de talla pequeña a mediana fue 73% (113/154 intentos). Debido a su adaptabilidad, el alto éxito de captura y el bajo costo, este sistema puede ser una herramienta beneficiosa para la investigación de las aves.

[Traducción de César Márquez]

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